reopsis palmata, Cacalia tuberosa, Verbena stricta, Asclepias verticillata, Acerates longifolia, A. viridiflora, Juncus nodosus, var. *megacephalus*, etc.

Some good species have been omitted as belonging strictly to none of the divisions made but rather a mixture of all and brought together by artificial conditions, as along the railroads. For instance, between Laporte and South Bend we found, in addition to very many of the species just mentioned as belonging to the prairie region, *Anemone cylindrica, Helianthemum Canadense, Lechea major, Polygala polygama, Lupinus perennis, Astragalus Canadensis, Potentilla argentea, Vaccinium Pennsylvanicum, Seymeria macrophylla, Gerardia flava* (with leaves in every case decidedly acute), *G. pedicularia, Ruellia ciliosa, Apocynum androsæmifolium, Habenaria virescens, H. ciliaris, Tofieldia glutinosa, Allium cernuum*, etc. In a ditch were collected *Lemna polyrrhiza* and both species of *Wolffia*.

In the streets of Goshen we found *Borrago officinalis*, L., looking as though it had taken up its abode permanently, though of course we could not tell. There was an old garden near by from which it had undoubtedly escaped but probably was not established sufficiently to entitle it to a place in our flora.

In conclusion, I would request that all botanists of Indiana, or those who have worked in Indiana, communicate with me in regard to the catalogue of the state flora, that it may be made as full and complete as possible upon the first issue.—J. M. C.

Potato Pierced by Grass.—A case of this is given in the Gazette for December. The past season I found two tubers in one hill pierced by stems of *Poa pratensis*. I mention this because some people still doubt that such a thing can take place. I have no doubt quick-grass is often carried from one farm to another where it has grown into potatoes. The growing point of the stems of quick-grass and June-grass are quite sharp and stout.—W. J. Beal, *Lansing, Mich.*

The Botrychia not Ferns.—In nearly all the botanies now in use, the species of *Botrychium* and *Ophioglossum* will be found included among the Ferns, arranged either at the commencement or close of that family under the head, Sub-order *Ophioglossaceæ*. Hooker, in his "Synopsis Filicum," makes the same arrangement although in "Species Filicum," published previously, he omits them altogether, as not coming within the province of that work. Until very recently, but little was to be found written upon these interesting plants on this side of the water, and even the descriptions in the American

botanies are very meager, and do not always include the full number of species to be found within the limits of the territory which these works are intended to include.

Of the nine species of *Botrychium*, acknowledged by Milde in his monograph of the genus, we are fortunate in being able to find six (possibly seven) in this country. Within a year, "Botrychium simplex" and "Vernation in Botrychiums," by Geo. E. Davenport, and description of most of the species of *Botrychium* in the "Ferns of North America," by Prof. D. C. Eaton, have made their appearance, adding much of value to the literature of the subject as far as the American species are concerned. Yet we are still obliged to seek among foreign authors information concerning their structure, the position of the *Ophioglossacæ* in the vegetable kingdom, and their relations to other nearly allied plants.

In Sachs's "Text Book of Botany" are to be found the results of the later investigations regarding the structure, mode of growth, and method of reproduction of the class *Ophioglossaceæ*, which includes three genera only, viz: *Ophioglossum, Helminthostachys* and *Botrychium*. If we examine any of the native species of *Botrychium* when they are first developing their fronds, we shall find at the outset that, unlike the Ferns, which are circinate in their mode of vernation, the *Botrychia* develop their fronds from the ground in an erect position, and if the base of the plant is examined under the microscope, the buds for several succeeding years will be found one below another, still in an erect position, the rudimentary sterile and fertile fronds in the most highly developed buds clasping each other. This mode of growth is the same with all the plants of the class *Ophioglossaceæ*.

As far as is now known, the growth of the prothallus from the spore takes place under the ground; at least this is the case with those plants in this class of which the prothallus has been observed. The prothallus is very small, not over 2 mm. in diameter, has but few root hairs, and is destitute of chlorophyll; while with the true Ferns the prothallus is often 6 or 7 mm. in diameter, has a profusion of root hairs, contains much chlorophyll, and develops above the ground. In fact the Ferns have a much greater thalloid exhistance in every way than the *Ophioglossaceæ*. The spores of the Ferns are in cases, which are developed from the outer layer of cells of the frond, and are therefore to be considered as trichomes. The spores of the *Ophioglossaceæ*, on the contrary, are derived from the inner tissue of the fertile spike or frond which bears them, and therefore cannot be referred to trichomes, but, as Sachs suggests, more strongly resembles the produc-

tion of pollen in the anthers of flowering plants. These very important differences between the Ferns and the *Ophioglossaceæ*, require us to place them in separate classes of equivalent value.

As the *Equisetaceæ* are in some respects more highly differentiated than the Ferns, they must therefore be placed in advance of them in the system of classification; yet both the Ferns and Equisetums have an extensive thalloid exhistance, and therefore must be placed below the *Ophioglossaceæ*, which in turn having only one sort of spores, as have also the Ferns and Equisetums, must remain with them in the isosporous division of vascular cryptogams, in position nearest the heterosporous division, where male and female prothalli are developed from different spores of the same plant, and thus suggest the stamens and pistils of flowering plants.

It is not intended to offer here anything more than a mere suggestion as to the position occupied by the *Botrychia* (*Ophioglossaceæ*) in a general classification; but as the interest increases in the collection of our American species, it will be inquired, where information can be obtained regarding them.

It should be known more generally by collectors that *Ophioglossum* and *Botrychium* are not true ferns, and that they should be looked upon rather as fern allies, for they differ from the Ferns more than the Equisetums, and as much as most Lycopods.—JOHN ROBINSON. [*Science News*, *Dec. 15.*]

A REPLY.—We are exceedingly sorry if the pages of the GAZETTE have been the means of causing hard feeling between some of our Iowa botanists. In the September number we published a communication from Mr. J. C. Arthur, author of the Catalogue of the Iowa Flora, in which he replied to certain statements that had been published in reference to his Catalogue. We have a reply from the Rev. Rob't Burgess claiming that we have not treated him fairly in not publishing some of his communications in which he had corrected the mistakes that had been made. Of course, if we have thus failed to do Mr. Burgess justice, we are ready to right it as far as we can, and for this purpose we publish some of the statements of his letter.

"A criticism upon my Botanical Reports, in the September GAZETTE, calls for a brief reply. The writer charges to my account two articles in the GAZETTE and *Bulletin*, for the publication of which I am not responsible. Mr. Arthur, ignorant of the fact that I had sent a correct report to the GAZETTE (unpublished) to rectify and replace them, says that "barely 1-5 of all my analyses were correct." [This is a

mistake, as there is no such statement in the article referred to. Mr. Arthur says that "over a fifth were incorrectly named."—EDS.] I printed three reports, 75 plants in all, in which I admit 5 false analyses, with a few doubtful." We readily concede that the fault is all our own in ever having admitted for publication species that were doubtful and hence we are ready to receive all the fulminations of the parties and will trouble the readers of the GAZETTE with no more of it.—EDS.

FERNS OF NORTH AMERICA, Parts 10 and 11.—This work continues of the same excellence and when completed will give us as beautiful and elaborate a monograph upon our Ferns as we could desire. As a general rule the figures are all excellent, so that even an ordinary observer would be able to recognize and determine almost any fern he would find. The present parts contain *Osmunda regalis*, L., *O. Claytoniana*, L., *O. cinnamomea*, L., *Aspidium Thelypteris*, Swartz, *Polypodium vulgare*, L., *P. Californicum*, Kaulf., *Scolopendrium vulgare*, Smith, and *Lomaria Spicant*, Desvaux. All the figures impress us more favorably than that of *Osmunda regalis*. It is unlike any form of that species that grows here and we were compelled to read the name before knowing what it was. Our royal fern should make a more impressive picture. Besides there is not that sharpness and distinctness of outline that marks most of the other figures, as *Aspidium Thelypteris* for instance, or the two species of *Polypodium*

NOTE.—For the fantastic mistakes that appeared in the December number of the GAZETTE, our readers will please not hold us responsible. They were due to the conceit of a printer, whose knowledge of botany is somewhat limited.

WE would call attention to the advertisement of H. Eggert, Esq., of St. Louis, Mo. The plants he offers for sale are remarkably cheap, but that does not imply that they are remarkably poor. Many of the species are exceedingly rare and the specimens are complete and fine, among the very best we have ever received. When a botanist can select fine specimens of his desiderata for four cents a species, he had better avail himself of the offer. Mr. Eggert has an abundance of plants and will send a list of them to any one upon application.

WE begin to publish in the next number a very interesting series of papers from Mr. A. H. Curtiss upon the flora of the shell islands of the Florida coast.